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ABSTRACT

Cognitive style research is hindered by a variety of poorly described measures and style classifications and the use of small samples. This study describes and compares three measures of three postulated dimensions of cognitive style: impulsivity/reflectivity; internal/external locus of control; and field dependence/field independence to determine (1) the shape and characteristics of the score distributions yielded by each measure, (2) the reliability of each measure, and (3) the psychometric characteristics of each test item using a 274-subject-sample of seventh grade students. Results are discussed with respect to each measure and conclusions are offered concerning the utility of each instrument in cognitive style research. (Author/MV)

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Three Tests of Cognitive Style:

Item Analyses and Characteristics

Background and Significance of the Problem

The proliferation of curricular and environmental options open to educational planners in the 70's has created opportunities for increasing flexibility in the selection and use of teaching strategies and materials, especially in reading and mathematics where a variety of media and learning packages exist. This phenomenon has initiated much discussion of criteria for selecting alternatives, especially when the objective is to individualize instruction to produce optimal cognitive and affective changes in each student. One interest is in the possibility of achieving "matches" between the characteristics of certain instructional modes and materials and student variables such as learning or interact with aspects of curricular materials or teaching strategies to influence learning.

The topic of learning style or cognitive style has grown out of both theoretical and practical interests. Teachers notice that students learn in different ways: some through manipulation of concrete materials, others through the application of abstract logic, still others seemingly through trial-and-error, etc. Furthermore, a preliminary review of recent research literature shows that investigators have considered cognitive style from several different conceptual viewpoints, producing an extensive research literature on the topic (Frederick and Klausmeier, 1970).

One popular approach views cognitive style variations as correlates

of personality development (Brinkman, 1973; Harvey et al., 1961; Kreitler and Kreitler, 1970; Messick and Fritsky, 1963; Mussen et al., 1963; Proshansky and Seidenberg, 1965; Shouksmith, 1969; Wallach and Kogan, 1965; Wachtel, 1968; Witkin et al., 1962, 1967). These researchers and others have identified several dimensions of cognitive style: tempo; risk-taking; impulsivity/reflectivity; flexibility/inflexibility; and field-dependence/field-independence in their work and have developed or used a number of different measurement instruments to define and quantify these dimensions at various age levels.

Cognitive style has also been considered in the information-processing model (Kagan et al., 1964). The relationships of cognitive style with aspects of school performance and aptitude have been examined in several contexts by numerous authors (Atwood, 1967; Braund, 1967; Christos, 1972; Cohen, 1968; Davids, 1968; Fiebart, 1967; Glaser, 1968; Grippen, 1973; Heath, 1964; Kaplan, 1969; Kavenaugh, 1969; Kempa and Dube, 1973; Lewis et al., 1968; Lezotte, 1969; Satterly and Brimer, 1971; Savelson, 1972; Wicker, 1969; Wineman, 1971; Witkin, 1965; Yeatts and Strag, 1971).

The relationship of cognitive style variations and perceptual and physical components has been yet another direction of recent research (Gardner et al., 1968; Katz, 1972; Stuart, 1967). In terms of overall cognitive development, the concept of cognitive style has been integrated by various authors into such diverse models as Guilford's Structure of Intellect and Piaget's developmental stages; and the work of Holland (1966) has been cited in examinations of the role of cognitive style variation in vocational and educational choice (Johannson, 1971; Osipow, 1969).

In short, the notion of cognitive style or learning style has been incorporated into a variety of research studies in which individual

differences play a role (Gagne, 1967). The potential of the style dimension in educational remediation and prescription has been postulated by many authors, including Marianne Frostig (1971) and David Ausubel (1969), with the prediction that assessment of learner variables including cognitive style will eventually become a routine diagnostic procedure at different educational levels, although the major body of research to date has dealt with college students and adults.

However, despite all the research activity, there has been little attention to ascertaining the coherence or relationship of the different approaches or dimensions by which the problem of style assessment has been examined. The major reason why the research on cognitive styles has very little coherence is that studies use a variety of measurement strategies and style classifications and, for the most part, focus on relatively small groups. There has been little or no effort to coordinate findings or to extract common conclusions or generalizations from the research efforts to date. Moreover, there has been no attempt to describe the measures and item characteristics of the measures used to determine cognitive style or to compare the results of several measures administered to a single sample.

Research Questions

The present study described and compared three measures: one related to each of three dimensions postulated in cognitive style research--impulsivity/reflectivity; internal/external locus of control; and field-dependence/field-independence.

Specifically, the following questions were posed with respect to each measure examined:

A. What is the distribution of total scores on the measure?

B. What is the reliability of the measure?

C. What were the psychometric characteristics of each item?

Method

The Sample

The 274 subject sample consisted of the entire seventh grade of a suburban Connecticut junior high school (143 males and 131 females). This sample was predominantly of Anglo descent although Black, Oriental, and Hispanic students were included; socio-economic position was predominently upper and upper middle class, with average IQ levels around 110. 47.7% (130) reported average report card grades of A; 27.7% (76) reported B averages; and 22.6% (62) reported C averages. The remaining 1.5% (4) students either reported D averages (n = 1) or did not complete this self-report item (n = 3).

The Instruments

Three group measures of cognitive style were administered to each subject. Although much attention has been paid to the development and use of measures with adults or with very young children, a good deal less work has been done at this particular grade and age level. Furthermore, it was difficult to locate many measures referred to in the research literature and several were deemed unsuitable or sufficiently obscure as to limit their usefulness in the present study. Of the measures located, most tended to deal with the "internal vs. external" locus of control variable rather than with other hypothesized dimensions. After much searching, three measures were selected for use: The Group Embedded Figures Test (Oltman, Raskin and Witkin, 1971); the Nowicki-Strickland Locus of Control Scale for Children (Nowicki and Strickland, 1971); and the Sutton-Smith and Rosenberg

Impulsivity Scale (Sutton-Smith and Rosenberg, undated). A detailed description of each measure will precede a discussion of the findings with regard to that instrument in the results of this paper.

Data-Gathering Procedures

About 3 weeks before the actual administration of the measures, the researcher and her assistant visited class groups and gave a brief orientation to the project which included assurance of anonymity and an introduction to the format of the three measures employed in the study. On the testing day, regular groups from core classes reported to a cafeteria area during their class period. The measures listed above were administered in a completely counterbalanced order, referred to as "modes" (see Table I). The 6 modes were assigned to groups via a random number table; likewise, the researcher and assistant were assigned randomly to conditions as testors. The classroom teachers accompanied the students to the testing room and assisted in proctoring, distributing and collecting materials but were not responsible for actual test administration. Total testing time for the three measures averaged 32 minutes per group. All groups completed all instruments within the regular assigned class period.

Scoring and Analysis

Following completion of testing, the following data were derived and recorded on punched cards for each student: sex, birthdate, reported achievement level (A-F), individual item responses on the three measures, and total scores on the three measures. These data were analyzed by application of SPSS item analysis programs to derive: descriptive data for each test; item analysis data for each test; and reliability estimates for each test.

Results and Discussion

The Nowicki-Strickland Locus of Control Scale for Children

This instrument is a descendant of the scales developed by Rotter (1966), Bialer and Cromwell (1961) and others to measure "the locus of control of reinforcement dimension in children" (Nowicki and Strickland, 1971, p. 2). This dimension has been described by Rotter, who remarks that:

> When a reinforcement is perceived by the subject as following some action of his own but not being contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way by an individual, we have labeled this a belief in external control. If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in internal control. (p. 1)

Several researchers, including Coleman et al. (1966) have indicated that locus of control-related beliefs appear to have an influence on school achievement and this construct has thus played a very strong role in the literature on cognitive style.

The Norwicki-Strickland Scale was chosen for this investigation because one form of the scale was applicable directly for the seventh grade sample being studied. Moreover, the authors of the scale provide a good deal of documentation regarding its development and its promise as a research instrument (Nowicki and Strickland, 1971). The scale also matched the more pragmatic requirements of ease of administration to large groups within a limited period of time. The date derived in the present study added to the information already known about the instrument. The reported corrected internal-consistency estimate for the 21-item form used in this study was .68 ($n = 54$) and the test-retest reliability estimate involving

a 6-week interval derived from the same seventh grade sample was .66 (Nowicki and Strickland, 1971). Item-total correlations derived by the authors of the scale were also available and could thus be compared with the indices obtained in the present study.

The instrument consists of 21 statements in question form, to be answered by circling "yes" or "no". The present study used the intact original instrument with questions in the same order. The only noticable changes were the omission of the title--N S Personal Reaction Survey Grades 7 though 12--and the insertion of directions and items concerning demographic data at the beginning of the survey (see Appendix A). All items were keyed positively except items 4, 13, and 20; with high scores indicating externality. No norms were available for the instrument.

The descriptive data derived from the administration of the Nowicki-Strickland Locus of Control Scale for Children appear in Table 2. The reliability of the instrument was determined in the present study by the use of the Kuder Richardson 20 estimate of internal consistency. The obtained value for KR_{20} was .58.

Item characteristic data appear in Table 3. The item total correlations offered by Nowicki and Strickland are shown in columns 2 and 3, while the indices derived from the present study are shown in column 1.

Examination of the score distribution for the instrument (Table 2) indicates a symetrical distribution of scores that is, at the same time, markedly leptokurtic. However, it is also apparent that the entire range of scores (0-21) on this instrument is being "used" since the scores of the present group ranged from 1-19. This is a useful finding, especially in view of the comparative homogeneity of the group being described with respect to scholastic aptitude, reported school achievement level, and

socio-economic status. Range restriction associated with these factors does not seem to be a potential difficulty in this instrument.

The shape of the score distribution and the summary statistics for the present group also indicate possible difficulties in using an instrument such as the Nowicki-Strickland Locus of Control Scale for Children for categorization of subjects into dichotomous groups of "internals" vs. "externals". The bulk of the group cannot be neatly calssified since their scores fall rather resoundingly in the center of the distribution. Nor would a median split be of much use here since the probability of faulty classification near the cutoff is potentially quite large. Indeed, there is only a 4 point spread of scores for the middle 50% of the group. Using only the high and low quarters of the group for the extremes is probably the safest practical solution in this case, although this indicates that the initial sample size necessary to achieve these classifications could be at least twice that of the projected final group--a rather expensive procedure in terms of time and resources. Frankly, it would be desirable to construct a scale that yields a bimodal distribution which would facilitate categorization into dichotomous groups and then to apply distribution-free statistics to analysis of data derived as the result of such classification.

The categorization problem is intensified when the reliability of the instrument is considered. Although .58 could be considered a lower-bound estimate, it is an inescapable conclusion that the consistency of the Nowicki-Strickland scale is modest. This further accentuates the potential folly of using scores near the center of the distribution in forming group categorizations.

Examination of the item analysis information leads one to question the unidimensionality of the scale since item-total correlations obtained from

the present group range all the way from -.06 to .48. Since these estimates were derived without deletion of the respective item from the total score, they can be regarded as slightly inflated. The three items with the smallest values were the three negatively-keyed items. Although it is usually advisable to include negative items in a scale such as this to preclude acquiescent tendencies, this procedure actually seems to have detracted from the scale in this instance even though these three items did form a distinct group when compared to the 18 positively-keyed items. Moreover, the examination of the response style difficulty with measures of cognitive style do not tend to show conclusively that acquiescence is of major concern to developers of assessment strategies (Sutton-Smith and Rosenberg, undated).

In view of the modest internal consistency of the items on the Nowicki-Strickland Locus of Control Scale for Children and the type of distribution it yielded in this study, its usefulness is rather limited. Although most of the items function in the desired direction, a good deal of refinement must be done with this instrument before it can be used with any confidence.

The Sutton-Smith, Rosenberg Impulsivity Scale--D version

Although the impulsivity/reflectivity dimension is generally thought of as a component or correlate of cognitive style, it was difficult to locate a suitable measure of this construct for this age level. The Sutton-Smith, Rosenberg scale (Sutton-Smith and Rosenberg, undated) was deemed the most appropriate instrument although modifications were made in the scale before it was used.

The original scale was developed over a period from 1959 to 1965 (Sutton-Smith and Rosenberg, 1959 a, b, 1961; Hirschfield, 1965) using the following general definition of "impulsivity": "...the tendency of the

child to be restless, to indulge in horseplay, lose control of his feelings, break the rules, enter activities with overwhelming vigor, and generally lose control in acceptable and unacceptable ways." (Sutton-Smith and Rosenberg, undated, p. 1). The latest version, resulting from Hirschfield's work was the starting point for the revision used here. The instrument consisted of 25 items (see Appendix B), several of which were judged inappropriate because of awkward wording, emphasis on activities with low social desirability (i.e. throwing stones) or possible invasion of privacy (i.e. "My home life is not always happy). The modified version of the scale (D-version) appears in Appendix C. It contains 17 "old" items, 11 of which were unchanged from the original and 6 of which were edited slightly. These items appear as the first 17 items in the D-version. In addition, 13 new items were written and these appear as items 18 through 30 in the D-version. The new items, like the original items, were all keyed "yes" for impulsivity. Other modifications included omission of the title--What I like to do--and use of the same demographic items and instructions used for the Nowicki-Strickland Locus of Control Scale for Children described earlier. Since modifications were made in the scale, it is inappropriate to cite reliability and item characteristic data derived for the original scale. Moreover, since the scale underwent several changes in its development, the matching of extant item characteristic data to the particular version of the scale from which they were derived would be difficult.

The descriptive data derived from administration of the Sutton-Smith, Rosenberg Impulsivity Scale--D version, appear in Table 4. The reliability of the D-version was determined by use of the Kuder-Richardson 20 estimate of internal consistency. The obtained value of KR_{20} was .74.

Item characteristic data for the instrument appear in Table 5.

This instrument yielded scores which, like the Nowicki-Strickland scale, arranged themselves in a unimodal symmetrical distribution. Out of a possible score range of 0-30, the present group obtained scores ranging from 3 to 26. The importance of this large obtained score range in view of the homogeneity of the group has been indicated above, as has the possible difficulty of using a scale yielding such a distribution to form dichotomized groups. Fortunately, several mitigating circumstances appear in connection with the Sutton-Smith, Rosenberg Scale D-version that render it a bit more usable than the Nowicki-Strickland. First, the distribution is wide enough to permit a rather large score range for the middle half of the group (7 points). Also, the reliability of the instrument (.78) is more encouraging than that of the Nowicki-Strickland scale, indicating more homogeneity among the items.

Unfortunately, since no data on item-total correlations could be located for the original scale, no comparisons could be made. However, average item-total correlations for the "old" items was .36 and average item-total correlations for the "new" items was .32. When item 18, which clearly did not perform well in the scale, is deleted, the values would probably be more indicative of the values to be expected upon actual application of the instrument.

In general, while a bimodal distribution would be preferred in the Sutton-Smith, Rosenberg Impulsivity Scale--D version, for reasons cited previously, this instrument does tend to be fairly usable in its present form.

The Group Embedded Figures Test (GEFT)

Designed as an adaptation of an individually-administered test of the

perceptually-based field dependence/field independence dimension, this instrument was developed by Oltman, Raskin, and Witkin (1971). The test contains three sections: an unscored practice section with 7 items, and two sections with 9 items each which are both timed and scored. Items in each section are arranged in order of difficulty. Although intended to be "a flexible instrument for use with groups widely diversified in age and background" (Oltman, Raskin, and Witkin, 1971, p. 28), the only normative and reliability data available for the instrument in the manual are for liberal arts college students. Moreover, although the authors recommend adjusting the 5-minute time limit allotted to complete each 9-item section for groups other than adults, no exact guidelines are given since this instrument is admittedly in the research stage of development. The correlation of the two scored sections using the Spearman Brown Prophecy formula is .82 and this is the only reliability datum offered in the manual (Oltman, Raskin, and Witkin, p. 28). The present study was an opportunity to add needed information to that already available for this instrument.

For this study, the Group Embedded Figures Test was used in its exact published form and directions were the same as those offered in the manual. However, subjects were asked to fill in only their birthdate in the section asking for identifying information. The only other modification was the allottment of 6 minutes per section instead of 5 minutes. This change was in accord with the authors' suggestion and would be recommended for future use of this instrument with groups similar to the one used in the present study.

Descriptive data derived from administration of the GEFT appear in Tables 6, 7, and 8.

The reliability of the GEFT was estimated by several methods. Internal

consistency estimates based on KR_{20} were derived for each 9-item section. In addition, an internal consistency estimate was calculated for the 18-item total. However, the reader is cautioned that these estimates may be inflated by the speed factor involved in the test. The correlation of the two separately timed and scored sections was also computed, along with the adjustment using the Spearman Brown Prophecy formula. These data appear in Table 9.

Finally, item-total correlations were computed for each section separately and for the combination of the two sections. However, the reader is again reminded that the speed factor in the test probably led to inflated reliability estimates, especially for items appearing near the end of each section. These data appear in Table 10.

The GEFT score distributions shown in Tables 6, 7, and 8 clearly show the presence of both a speed effect and a practice effect in the instrument. The speed factor is most clearly evident in section 1 results which show a definite positive skew. The practice effect in section 2 results is most apparent from the general elevation of the distribution as well as from its shape. Comparison of the means and medians of the two distributions shown in Tables 6 and 7 also indicate a difference in the general characteristics of the distributions.

These practice and speed effects mitigate against the comparability of sections 1 and 2 of the GEFT despite the test authors' claim that these sections are actually alternate forms of a 9-item task (Oltman, Raskin, and Witkin, 1971, p. 27). This observation is further reinforced by the uncorrected correlation of .76 between the two sections obtained in the present study and reported in Table 9. This is less than desirable even though each section consists of only 9 items. The corrected value of

.81 is not much more satisfactory even though it compares with the value reported by the authors in the test manual.

Examination of the score distribution for the entire test presented in Table 8 reveals a slight negative skew and a wide range of scores. A comparison of this distribution with those of each section considered separately indicates that use of the total score would result in a very different picture than consideration of either of the sections separately. While not symmetrical, the total score distribution does seem more usable than the half-test distributions, indicating that part scores for the GEFT should be viewed with extreme caution and that, for research purposes, the total score would be more useful. Again selection of the upper quarters would be suggested for formation of extreme groups since there appears to be a satisfactory separation between these portions of the distribution. However, because of the speed and practice factors pointed out earlier, it is probable that more is being measured by this instrument than field-dependence/field-independence, especially since the test authors offer scanty evidence of validity.

The item-total correlations cited in Table 10 rather clearly show the inflation that results from use of these indices with speeded or shortened tests since, in every case except one, the values reported for the total test are smaller than those reported for the sections taken separately. The reported item-total correlations are respectable, with only one item below .40. Although a general inflation has undoubtedly occured, the homogeneity of the items cannot be seriously questioned although even higher item-total correlations might have been expected in view of the type of items comprising the GEFT. The item content is figural, and require processes that are more perceptual than judgmental. Moreover, there is a

correct solution to each item in contrast to instruments that are of a self-report nature.

In general, the GEFT appears to be a fairly usable instrument although the speed and practice factors should be examined further, and the total score rather than part scores should definitely be used.

Other Results and Discussion

In order to compare the results of the three measures, their score distributions were plotted together in Table 11. Examination of this table further illustrates the leptokurtic tendency of the NS distribution and the relative symmetry of the three distributions of total scores.

Since all three measures were administered to the same group, there was an opportunity to compare the scores on the instrument by derivation of a table of intercorrelations. These data are presented in Table 12. All intercorrelations are statistically significant and indicate a modest relationship among the three measures. However, the magnitude of the relationships does not justify the conclusion that there is a significant redundancy in the measures in terms of shared variance, with the possible exception of the NS and SR-D version overlap.

Moreover, if these three measures are actually tapping different dimensions of a cognitive style domain, then the existence of some relationship among them would be expected due to the presence of a probable common source of variance.

Thus, while the relationships among the measures are statistically significant, there does appear to be sufficient independence in the results of the instruments to conclude that they are not all tapping the same variance sources.

Conclusions and Implications

The results of the study generally indicate that the three instruments examined are not shining examples of psychometric excellence. The GEFT appears to be most homogeneous in content though probably flawed by speed and practice effects. The Sutton-Smith, Rosenberg Impusivity Scale for Children--D version is fairly usable and has minimally satisfactory homogeneity in its revised form. The Nowicki-Strickland Locus of Control Scale for Children is the least promising of the instruments examined since it shows a very small differentiation between cases in the middle of the scale and has only modest reliability.

All three instruments yield distributions of total scores that encompass almost the entire range of possible scores, an indication that the homogeneity of the subjects used in the study did not have an attenuating effect on score ranges. None of the instruments yielded a bimodal distribution which would have been most efficient for categorizing subjects into groups. This observation, together with the generally modest reliability of the instruments, suggested that use of the upper and lower quarters for forming extreme dichotomized groups would be advisable although this procedure tends to be both wasteful and not indicative of overall population values.

Of course, this does not preclude the possibility that the variables under consideration are continuously distributed. Distributions such as those obtained in the present study would be appropriate in cases where extreme groups are not of interest, the assumption of normality in the characteristic is made, and/or analysis procedures assuming an underlying normal distribution are used.

All three tests appear appropriate to and well-received by the subjects involved in the study and were suited to groups as large as those employed

here, as well as being appropriate for use within fairly strict time constraints.

The user of these tests must regard them as tentative research instruments which yield results of only modest reliability, require a good deal of technical refinement, and should be interpreted with great caution. They are probably not suitable for extremely small samples, nor for application of statistical procedures that are influenced by score distribution characteristics, though homogeneous samples do not present significant difficulties in score interpretation.

Suggestions for Future Research

Each measure should also be examined separately to determine its underlying factor structure since all purport to measure a bimodal continuum of a single factor unique to that instrument.

The reliability and validity data for each of the three measures needs to be strengthened and supplemented. Retest correlations are virtually non-existent, as are descriptions of relationships with other possible relevant variables such as sex, personality characteristics, group membership, etc.

In view of the relative independence of the three measures, as noted by the table of intercorrelations, it is highly questionable to neglect the distinctness of the underlying dimensions being measured by the three instruments. There is sometimes a tendency in the research literature to think of the various domains of cognitive style as more or less synonomous--a notion that has not been confirmed by the results of the present study. Thus, the researcher must carefully select his measure as the one most likely to assess the concept of interest in a particular study.

Finally, the distinctness of the three measures should be further

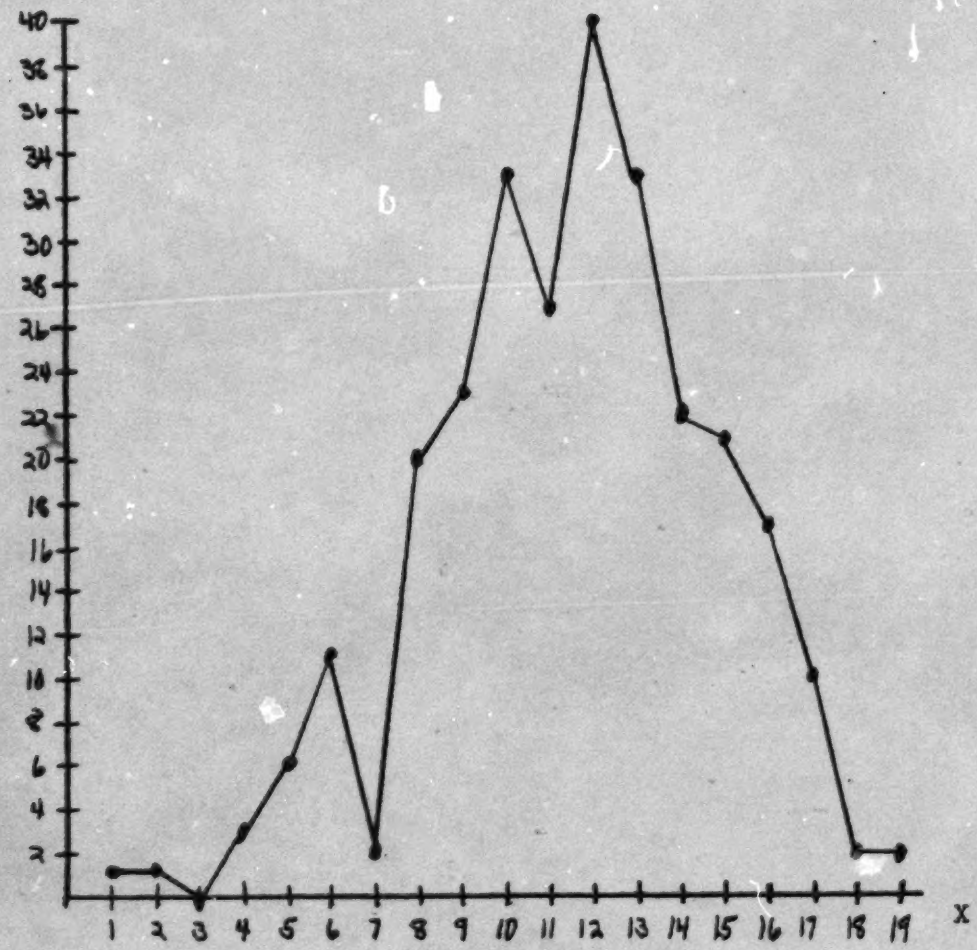
examined. Factor analysis of the scores on the three measures combined should be undertaken to verify the existence of separate factors corresponding to the dimensions of internal/external locus of control; impulsivity/reflectivity; and field-dependence/independence.

Table 1
Test Presentation Modes

Mode 1 = ABC*
Mode 2 = BCA
Mode 3 = CAB
Mode 4 = BAC
Mode 5 = CBA
Mode 6 = ACB

* A = Group Embedded Figures Test
B = Norwicki-Strickland Locus of Control Scale for Children
C = Sutton-Smith, Rosenberg Impulsivity Scale--D version

Table 2 Score distribution and descriptive statistics: Nowicki-Strickland Locus of Control Scale for Children



$\bar{X}$ = 11.6
s.d. = 3.2
mdn. = 11.8
lower quartile = 9.5
upper quartile = 13.8
semi-interquartile range = 2.1

Table 3

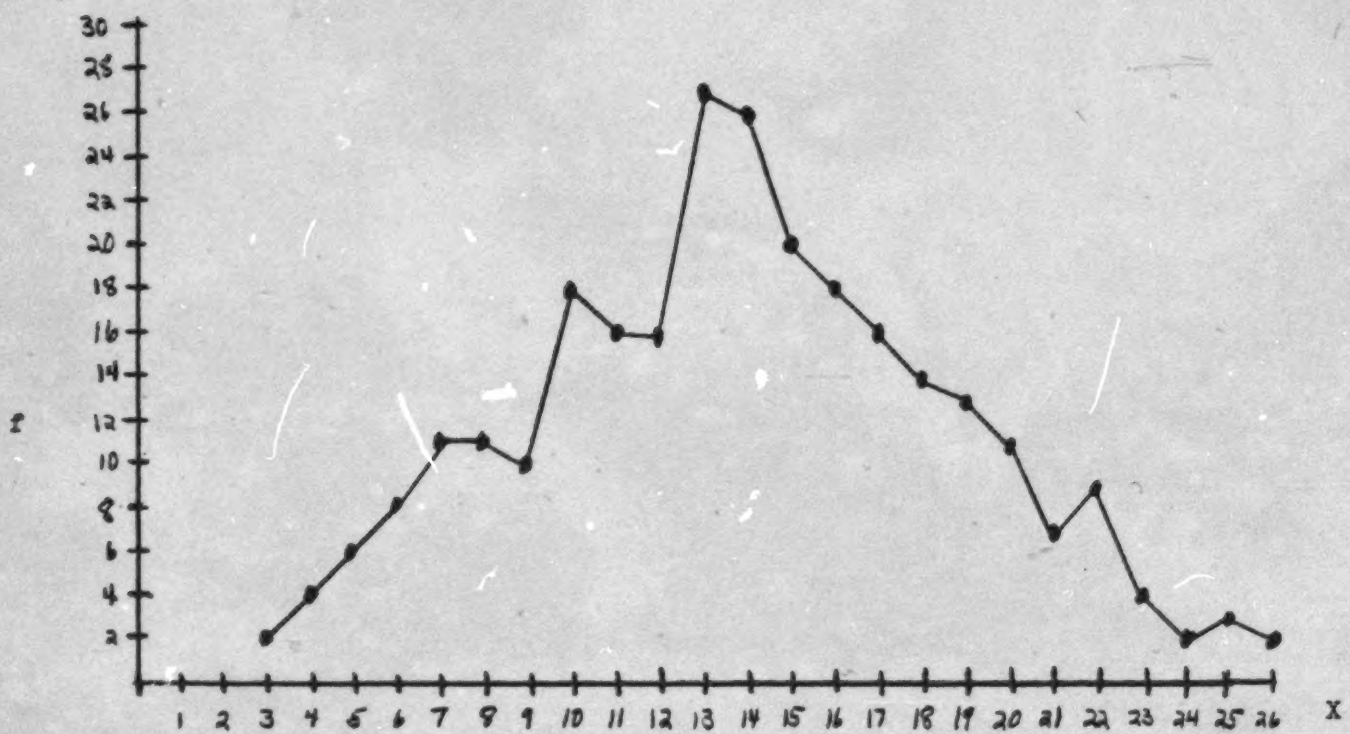
Item-Total Correlations:
Nowicki-Strickland Locus of Control Scale for Children

Denson, 1976	Nowicki & Strickland, 1971		Key	Item
	M	F		
.36	.49	.29	Y	1. Are some kids just born lucky?
.35	.17	.41	Y	2. Are you often blamed for things that just aren't your fault?
.38	.39	.33	Y	3. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?
-.06	.33	.06	N	4. Do you feel that most of the time parents listen to what their children have to say?
.24	.32	.26	Y	5. When you get punished does it usually mean it's for no good reason at all?
.29	.23	.27	Y	6. Most of the time do you find it hard to change a friend's mind (opinion)?
.42	.16	.40	Y	7. Do you feel that it's nearly impossible to change your parent's mind about anything?
.48	.49	.57	Y	8. Do you feel that when you do something wrong there's very little you can do to make it right?
.30	.32	.13	Y	9. Do you believe that most kids are just born good at sports?
.30	.26	.37	Y	10. Do you feel that one of the best ways to handle most problems is just not to think about them?
.36	.05	.29	Y	11. Do you feel that when a kid your age decides to hit you, there's little you can do to stop him or her?
.39	.14	.18	Y	12. Have you felt that when people were mean to you it was usually for no reason at all?

Table 3 Continued

Denson, 1976	Nowicki & Strickland, 1971		Key	Item
	M	F		
.05	.15	.30	N	13. Most of the time, do you feel that you can change what might happen tomorrow by what you do today?
.42	.32	.61	Y	14. Do you believe that when bad things are going to happen they are going to happen no matter what you try to do to stop them?
.47	.45	.34	Y	15. Most of the time do you find it useless to try to get your own way at home?
.42	.34	.52	Y	16. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?
.28	.35	.38	Y	17. Do you usually feel that you have little to say about what you get to eat at home?
.42	.30	.47	Y	18. Do you feel that when someone doesn't like you there's little you can do about it?
.47	.22	.31	Y	19. Do you usually feel that it's almost useless to try in school because most other children are just plain smarter than you are?
.09	.34	.26	N	20. Are you the kind of person who believes that planning ahead makes things turn out better?
.41	.27	.65	Y	21. Most of the time, do you feel that you have little to say about what your family decides to do?

Table 4 Score distribution and descriptive statistics: Sutton-Smith, Rosenberg Impulsivity Scale--D version



$\bar{X}$ = 13.9
s.d. = 4.9
mdn. = 13.8
lower quartile = 10.3
upper quartile = 17.3
semi-interquartile range = 3.5

Table 5

Item-Total Correlations:
Sutton-Smith, Rosenberg Impulsivity Scale--D Version

Denson, 1976	Item (from original scale)
.35	1. I like to keep moving around.
.20	2. I make friends easily.
.19	3. I must admit I'm a pretty good talker.
.20	4. Whenever there's a fire engine going someplace, I'd like to follow it.
.47	5. When things get quiet, I like to stir them up a little.
.46	6. I am restless.
.19	7. I like being "it" when games of that sort are played.
.41	8. It's fun to push people off the edge into a swimming pool.
.33	9. It's hard to stick to the rules if you're losing the game.
.46	10. I like to dare people to do things.
.38	11. I like to go around with lots of other people, not just one or two.
.31	12. I'm not known as a hard and steady worker.
.44	13. I like to just "blow off" steam.
.39	14. I don't think you should always have to do what you're told.
.40	15. I'll try almost anything once.
.35	16. I usually say the first thing that comes into my head.
.52	17. I often act on the spur of the moment without stopping to think.

.36

Table 5 Continued

Denson, 1976	Item (new to D-version)
-.01	18. I can't concentrate on my work when people are talking in the room.
.19	19. It's hard for me to save money even when I want to.
.20	20. When people are playing an exciting game, I want to get in it rather than just watch.
.26	21. I can't sit still when I hear really good music.
.50	22. It's fun to take chances.
.44	23. Sometimes I say or do things just to see how people will react.
.26	24. I but things I don't need just because I like them.
.36	25. I think museums are boring.
.41	26. I like "hard rock" music better than "soft rock" music.
.55	27. I seem to get into trouble a lot without even planning to.
.41	28. My friends think I'm a "character".
.38	29. I don't like to follow schedules or routines.
.19	30. I like to "tinker" with things.

.32

Table 6 Score distribution and descriptive statistics: Group Embedded Figures Test Section 1

Table 7 Score distribution and descriptive statistics: Group Embedded Figures Test Section 2

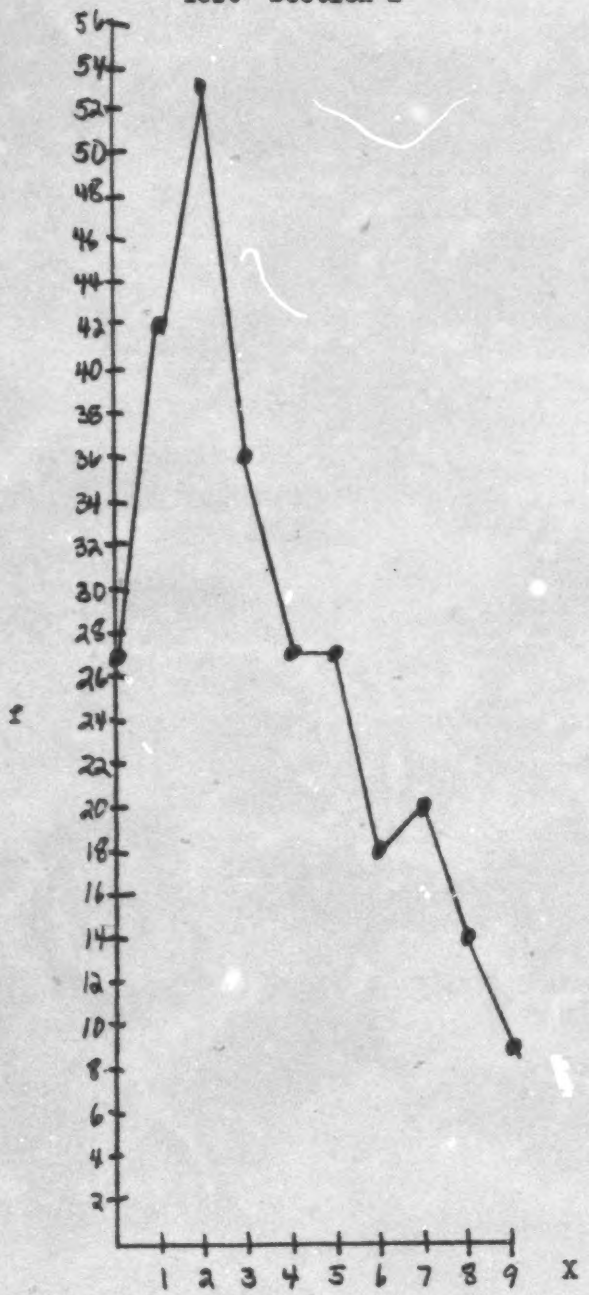


Table 6

$\bar{X}$ = 3.4
s.d. = 2.5
mdn. = 3.1
lower quartile = 1.4
upper quartile = 5.2
semi-interquartile range = 1.9

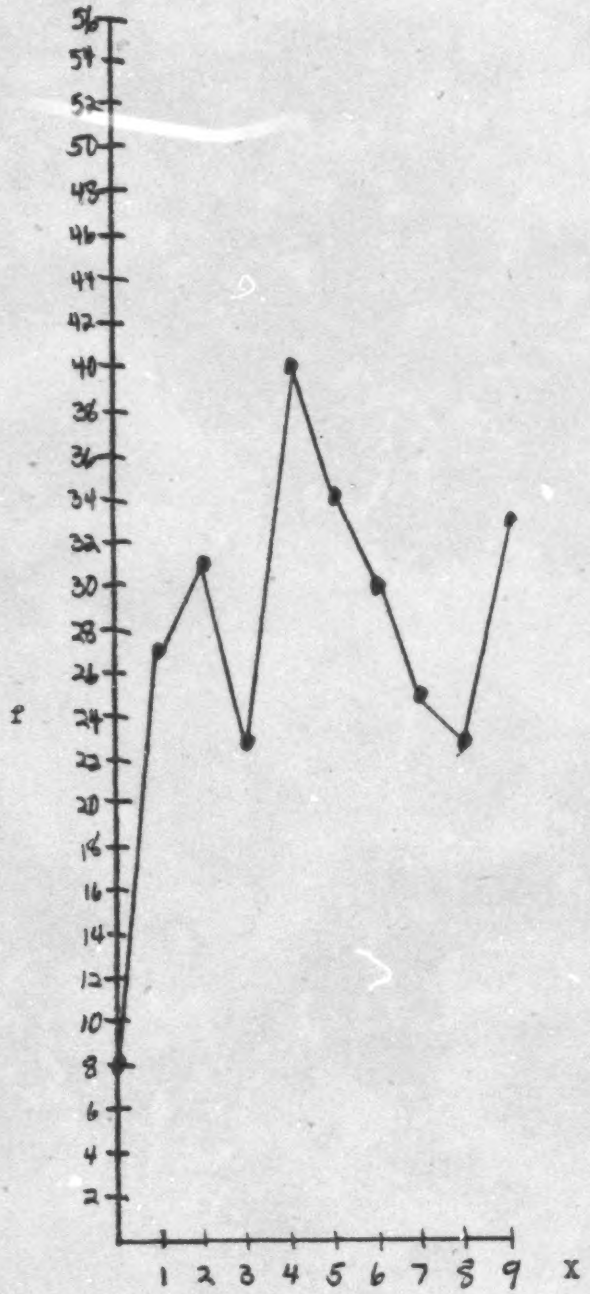
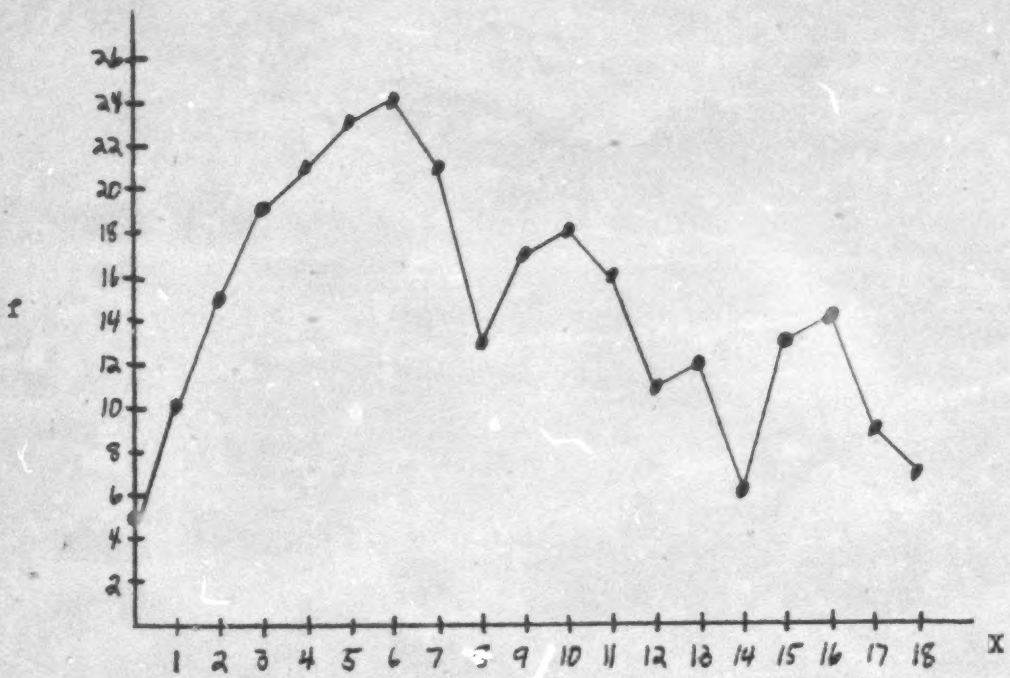


Table 7

$\bar{X}$ = 4.8
s.d.= 2.6
mdn. = 4.7
lower quartile = 2.6
upper quartile = 6.9
semi-interquartile range = 2.1

Table 8 Score distribution and descriptive statistics: Group Embedded Figures Test Total Score



$\bar{X}$ = 8.3
s.d. = 4.8
mdn. = 7.5
lower quartile = 4.4
upper quartile = 11.7
semi-interquartile range = 3.7

Table 9 Reliability Estimates: Group Embedded Figures Test

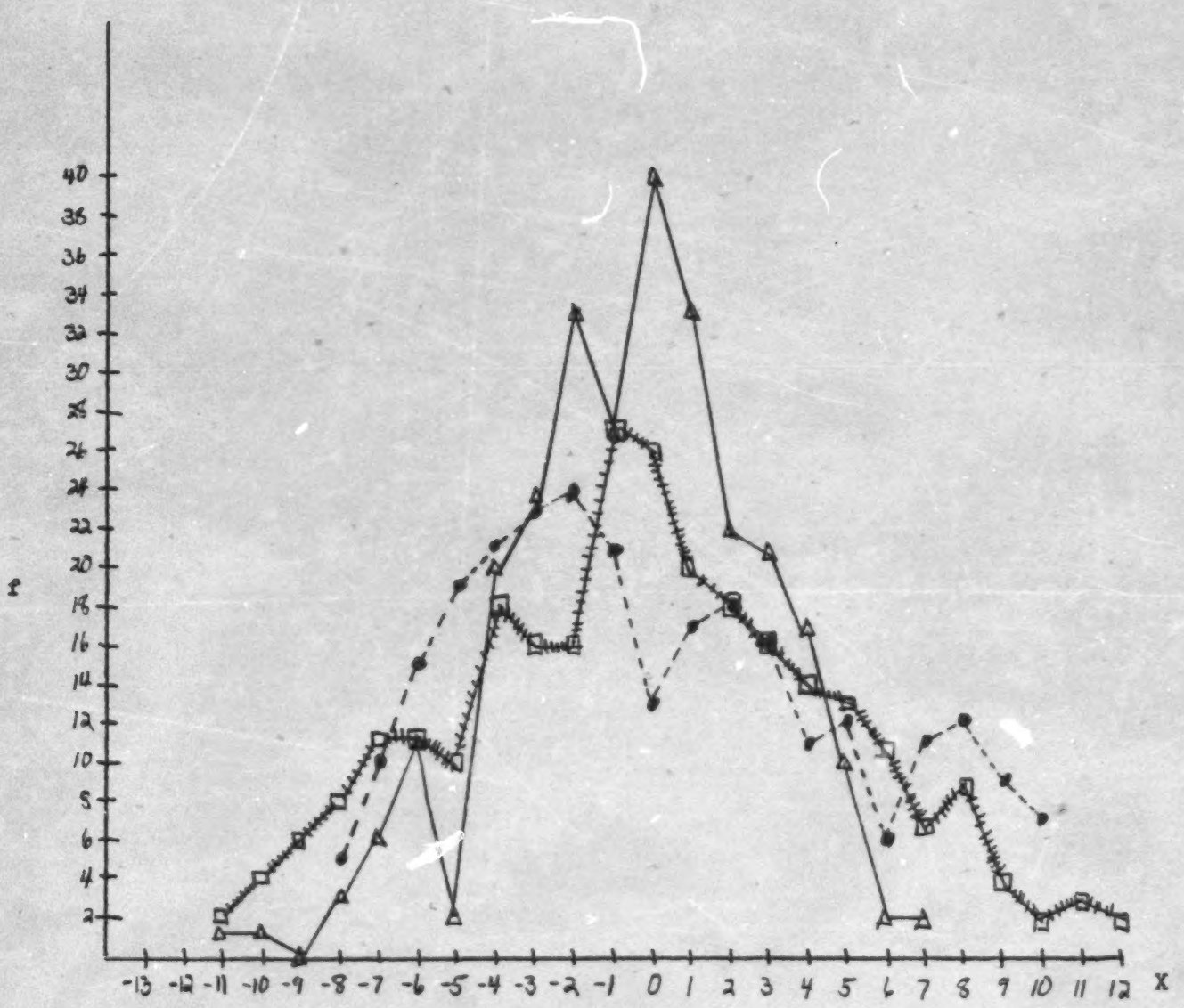
	Section 1	Section 2	Total Section 1 + Section 2
KR_{20}	.78	.81	.88

Spearman-Brown Sec. 1 vs. Sec. 2	$r_{12} = .76$ $r_{12_{cor.}} = .81$

Table 10 Item-Total Correlations: Group Embedded Figures Test

Item #	Section 1 only	Section 2 only	Total (Sec. 1 + Sec. 2)
1	.50		.46
2	.66		.63
3	.70		.69
4	.71		.70
5	.46		.43
6	.61		.53
7	.70		.65
8	.53		.45
9	.56		.53
10		.58	.51
11		.66	.60
12		.44	.38
13		.70	.70
14		.58	.58
15		.68	.67
16		.65	.60
17		.67	.58
18		.65	.64

Table 11 Score distributions:
Group Embedded Figures Test Total Score
Nowicki-Strickland Locus of Control Scale for Children
Sutton-Smith, Rosenberg Impulsivity Scale--D version



Legend: Nowicki-Strickland Locus of Control Scale for Children △—△

Group Embedded Figures Test Total Score ●---●--

Sutton-Smith, Rosenberg Impulsivity Scale--D version □-----□---

Table 12 Intercorrelations among the three measures (N = 274)

	GEFT-Total**	NS	SR--D version
GEFT-Total	-	.12 (.02)*	.15 (.01)
NS		-	.23 (.001)

** GEFT-Total = Group Embedded Figures Test Total Score
NS = Nowicki-Strickland Locus of Control Scale for Children
SR--D version = Sutton-Smith, Rosenberg Impulsivity Scale--D version

* values in parentheses indicate significance levels

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